

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
23 September 2004 (23.09.2004)

PCT

(10) International Publication Number  
**WO 2004/081897 A3**

(51) International Patent Classification<sup>7</sup>: **G08G 1/0967**,  
G01N 21/17, G01W 1/02

(21) International Application Number:  
PCT/DK2004/000168

(22) International Filing Date: 15 March 2004 (15.03.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
PA 2003 00386 14 March 2003 (14.03.2003) DK

(71) Applicant (for all designated States except US): **LIWAS**  
APS [DK/DK]; Life Warning System, Hans Broges Vej 4,  
DK-8220 Brabrand (DK).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **FRIDTHJOF**, Jack  
[DK/DK]; Rosenvangsallé 79, DK-8260 Viby J (DK).

(74) Agent: **PATENTGRUPPEN APS**; Arosgaarden,  
Aaboulevarden 31, DK-8000 Aarhus C (DK).

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-  
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,  
GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK,  
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments

(88) Date of publication of the international search report:  
4 November 2004

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: A DEVICE FOR DETECTION OF ROAD SURFACE CONDITION

(57) Abstract: A device is disclosed for detection of surface properties or conditions, in particular detection of water, snow and ice and in particular to read surfaces by means of detector means mounted on individual vehicles, and transmitting the data from the vehicle, preferably together with position data of the vehicle, to be used by drivers of other vehicles for warning of slippery road conditions ahead of the vehicle. According to a particular aspect, it has been realised that the fact that polarized light which is mirror reflected by e.g. ice or water on a surface, preserves its polarization, whereas polarized light which is diffuse reflected largely becomes depolarized, may be utilised to separate the two types of reflection and thus provide a much more compact sensor device for surface properties, in which the light may be emitted close to or parallel to the road surface normal.

WO 2004/081897 A3

# INTERNATIONAL SEARCH REPORT

ational Application No  
PCT/DK2004/000168

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G08G1/0967 G01N21/17 G01W1/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G08G G01N G01W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 720 137 A (OMRON TATEISI ELECTRONICS CO) 3 July 1996 (1996-07-03) page 7, line 20 - page 8, line 49 figures 1-3 page 19, line 4 - line 55 page 25, line 38 - page 27, line 5	1-3, 21, 22
Y	US 5 428 544 A (SHYU JIA-MING) 27 June 1995 (1995-06-27) abstract; figure 1	1-3
Y	US 5 852 243 A (CHANG JAMES SHIH-TSIH ET AL) 22 December 1998 (1998-12-22) column 1, line 48 - column 2, line 20; figure 1	21, 22
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \* & \* document member of the same patent family

Date of the actual completion of the international search

25 August 2004

Date of mailing of the international search report

06. 09. 2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Seisdodos, M

# INTERNATIONAL SEARCH REPORT

ational Application No  
PCT/DK2004/000168

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 541 413 A (JOHNSON KENDALL B ET AL) 30 July 1996 (1996-07-30) column 3, line 29 - column 5, line 35 column 7, line 6 - line 16 column 7, line 45 - line 57 -----	4-6
X	US 5 198 875 A (CHARDRON HERVE ET AL) 30 March 1993 (1993-03-30) column 1, line 37 - column 3, line 27; figure 1 -----	4-6
X	EP 0 558 927 A (TZN FORSCHUNG & ENTWICKLUNG) 8 September 1993 (1993-09-08) column 2, line 24 - column 3, line 47; figure 1 column 4, line 4 - line 7 -----	4-6
X	DE 43 00 896 C (OLDENETTEL HOLGER DIPL ING ; SCHROEDER GERALD DIPL PHYS (DE)) 21 April 1994 (1994-04-21) the whole document -----	4-6
A	US 5 557 040 A (INENAGA ANDREW S ET AL) 17 September 1996 (1996-09-17) column 4, line 20 - column 5, line 45 -----	7,8
A	US 4 844 584 A (MIYAGAWA ICHIROU) 4 July 1989 (1989-07-04) the whole document -----	7,8

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/DK2004/000168

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0720137	A	03-07-1996	EP 0720137 A2	03-07-1996
			JP 3472896 B2	02-12-2003
			JP 8263783 A	11-10-1996
			JP 2003346286 A	05-12-2003
			US 5699056 A	16-12-1997
US 5428544	A	27-06-1995	NONE	
US 5852243	A	22-12-1998	CA 2260733 A1	04-08-2000
US 5541413	A	30-07-1996	AU 4521893 A	29-11-1993
			CA 2133307 A1	11-11-1993
			EP 0637375 A1	08-02-1995
			JP 8500432 T	16-01-1996
			WO 9322655 A1	11-11-1993
			US 5406082 A	11-04-1995
US 5198875	A	30-03-1993	FR 2665959 A1	21-02-1992
			CA 2049264 A1	17-02-1992
			DE 69109413 D1	08-06-1995
			DE 69109413 T2	08-02-1996
			EP 0475803 A1	18-03-1992
			JP 3194152 B2	30-07-2001
			JP 5220130 A	31-08-1993
EP 0558927	A	08-09-1993	DE 4205629 A1	26-08-1993
			EP 0558927 A1	08-09-1993
DE 4300896	C	21-04-1994	DE 4300896 C1	21-04-1994
US 5557040	A	17-09-1996	CA 2156892 A1	26-02-1996
US 4844584	A	04-07-1989	JP 1959579 C	10-08-1995
			JP 6087100 B	02-11-1994
			JP 63006519 A	12-01-1988
			JP 63006518 A	12-01-1988